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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/631,087	07/31/2003	Jonathan Jay Bernstein	MA03-004	2028
31362	7590	09/08/2004	EXAMINER	
JOANNE N. PAPPAS 45 NAGOG PARK ACTON, MA 01720			CHOI, WILLIAM C	
			ART UNIT	PAPER NUMBER
			2873	

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/631,087	Applicant(s) BERNSTEIN ET AL.	
	Examiner William C. Choi	Art Unit 2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12-15, 17, 19 and 20 is/are rejected.
- 7) ☒ Claim(s) 10, 11, 16 and 18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/31/2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0703_0903</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Information Disclosure Statement

Receipt of the Information Disclosure Statement (IDS) with the copies of the references cited therein was received on 7/31/2003 & 9/25/2003. An initialized copy of the IDS is enclosed with this office action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6 and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Taylor et al (U.S. 6,778,728 B2).

In regard to claim 1, Taylor et al discloses a spatial light modulator system (column 1, lines 12-15, Figure 4) comprising: a high fill factor MEMS array of tilting mirrors (column 3, line 62 – column 4, line 3) used to attenuate a plurality of wavelength channels in an optical network (column 2, lines 13-49); and will inherently comprise an interface control circuit capable of receiving and storing control signals for controlling said array of tilting mirrors, this being reasonably assumed from Taylor et al disclosing its use in optical switching devices such as wavelength selective switches, which require precision control (column 4, lines 44-47).

Regarding claim 6, Taylor et al discloses wherein said MEMS array is linear (column 1, lines 36-37).

Regarding claim 7, Taylor et al discloses wherein said high fill factor is greater than 90% (column 3, lines 65-67).

Claims 1, 4, 5, 8, 9 and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiu et al (U.S. 2002/0135864 A1).

In regard to claim 1, Chiu et al discloses a spatial light modulator system (page 1, section [0002], Figure 1) comprising: a high fill factor MEMS array of tilting mirrors (Figure 1) used to attenuate a plurality of wavelength channels in an optical network (page 1, sections [0002] & [0005]); and will inherently comprise an interface control circuit capable of receiving and storing control signals for controlling said array of tilting mirrors, this being reasonably assumed from Chiu et al disclosing its use in optical attenuators and switches, which require precision control (page 1, section [0002]).

Regarding claims 4 and 5, the control signals of Chiu et al will inherently comprise definitions for the extent of each of said plurality of wavelength channels and a desired attenuation within each of said plurality of wavelength channels, this being reasonably assumed from Chiu et al disclosing said device being used to ensure power equalization of individual wavelengths by adjusting the intensity for each wavelength and also to controllably adjust transmitted power (page 1, section [0005]).

Regarding claim 8, Chiu et al discloses wherein each mirror is said MEMS array of tilting mirrors further comprises a single tilting cantilever supported by two flexures (page 5, section [0058], lines 4-7, Figure 3, "54").

Regarding claim 9, Chiu et al discloses wherein each mirror has at least one actuation electrode (page 6, section [0066], lines 1-5).

Regarding claim 19, Chiu et al discloses wherein each of said MEMS mirrors is fabricated of a metal layer (page 5, section [0056], lines 1-6, Figure 3, "42").

Claims 1, 12, 13, 19 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Hill et al (U.S. 6,760,144 B2).

In regard to claim 1, Hill et al discloses a spatial light modulator system (column 1, lines 14-17) comprising: a high fill factor MEMS array of tilting mirrors (column 12, lines 24-26, Figure 5) used to attenuate a plurality of wavelength channels in an optical network (column 1, lines 29-25); and will inherently comprise an interface control circuit capable of receiving and storing control signals for controlling said array of tilting mirrors, this being reasonably assumed from Hill et al disclosing its use in add-drop optical switches and wavelength blockers (column 1, lines 33-36) which require precision control.

Regarding claim 12, Hill et al discloses wherein each mirror in said MEMS array of tilting mirrors is supported by side support flexures whose rotational axis is offset from the center of gravity of the mirror (Figure 3A, re additional component "360" shifts center of gravity).

Regarding claim 13, Hill et al discloses wherein each mirror comprises means for providing strain relief (column 6, lines 8-12, Figure 3A, "350", re "torsional flexibility").

Regarding claim 19, Hill et al discloses wherein each of said MEMS mirrors is fabricated of a metal layer (column 15, lines 39-41).

Regarding claim 20, Hill et al discloses wherein said mirror layer is polished using a CMP technique (column 15, lines 47-51).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiu et al.

Regarding claims 2 and 3, Chiu et al discloses as set forth above and further discloses wherein said array of mirrors is fabricated on the same substrate, but does not specifically disclose wherein said control circuit is fabricated on or off the same substrate. Examiner takes official notice that it is well known in the art to fabricate control circuits on or off the same monolithic substrate as mirror arrays depending on the design of the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate control circuits on or off the same monolithic substrate as mirror arrays since it is well known in the art to do so depending on the design of the system.

Allowable Subject Matter

Claims 10, 11, 16 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claims 10 and 11: a spatial light modulator system comprising a high fill factor MEMS array of tilting mirrors as claimed, specifically wherein each mirror in said MEMS array of tilting mirrors further comprises a single tilting cantilever with an asymmetric flexure resulting in 2-axis rotation.

The prior art fails to teach a combination of all the claimed features as presented in claim 16: a spatial light modulator system comprising a high fill factor MEMS array of tilting mirrors as claimed, specifically wherein each mirror has at least one landing electrode having a same potential as said mirror.

The prior art fails to teach a combination of all the claimed features as presented in claim 18: a spatial light modulator system comprising a high fill factor MEMS array of tilting mirrors as claimed, specifically wherein each mirror in said MEMS array of tilting mirrors comprises at least one stiffener rib located above or below the mirror plane from maintaining mirror flatness.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Choi whose telephone number is (571) 272-2324. The examiner can normally be reached on Monday-Friday from about 9:00 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

W.C.
William Choi
Patent Examiner
Art Unit 2873
September 1, 2004


Georgia Epps
Supervisory Patent Examiner
Technology Center 2800